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The anomalous anther-structure of Dicorynia, Duparquetia, and Strumpfia

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While engaged in the histological portions of a study of the apically dehiscent anther,* I found myself particularly interested by three forms which have not been fully understood by systematists, and since it will probably be a considerable time before my final memoir can appear it has seemed advisable to offer my notes on these genera in a form and place which will render them more accessible to the taxonomist, for whom they are particularly intended, than they would be in a thick paper of morphological and ecological nature. The forms to be considered here are *Dicorynia* and *Duparquetia* of the *Leguminosae*, and *Strumpfia* of the *Rubiaceae*.

We may confine our attention strictly to the morphological features, leaving histological detail for the special treatment.

The first form is *Dicorynia* Benth. † The androecium of this peculiar South American representative of the *Cassieae* has been characterized as follows: Stamens 2, free, unequal; filaments short and thick; anthers basifixed, oblong, short and thick, that of the shorter stamen longer, often 8-locellate, dehiscing at the apex.

The form of the anthers in the specimen examined agrees very closely indeed with that figured in Flora Brasiliensis. Both anthers are smooth, brown in color and very hard. A series of sections was secured and mounted in sequence. Figures 1, a and 1, b represent sections from near the base and tip of the smaller anther, the one borne on the longer filament, and show that it has the 4-locellate structure of a typical anther.

In systematic works the larger anther, borne on the shorter filament, has been described as 8-locellate, and the first prepara-

* See HARRIS, J. A. Ann. Rep. Missouri Bot. Gard. 16 : 167–257 (1905), and Canadian Entomologist 37 : 353–357, 373–380, 393–398 (1905).

† Benth.; Mart. Fl. Bras. 15^2: 81. *pl. 29.*—Benth. & Hook. Gen. Pl. 1 : 571.—Taubert ; E. & P. Nat. Pfl. 3^3 : 165.

tions examined confirmed this opinion. Later, however, when serially arranged sections were secured, the real condition became apparent and is made quite clear by the outline drawings of selected sections for the series. Figures 1, c, 1, d and 1, e represent typical planes of the anther from the base to near the tip. It will be seen that all show two locules. In the lowermost sections each locule evidences two locelli. The succeeding sections show six, eight, and near the tip even ten locelli.

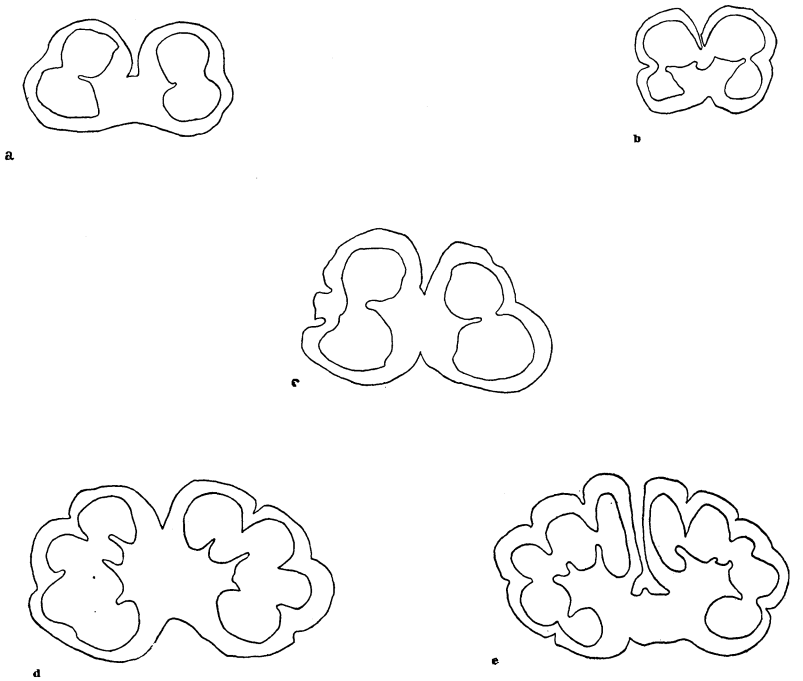

FIGURE 1. Anther-structure of *Dicorynia*.

In structure and geographical distribution *Duparquetia* Baill.* is an anomalous and most interesting monotypic genus found in west tropical Africa.

The androecium has been described as follows: Stamens 5, more rarely 4; filaments short, flattened; anthers basifixed, linear,

* Baillon, Adansonia **6**: 189. *pl. 4.* — Benth. & Hook. Gen. Pl. 1: 570.— Benth. Trans. Linn. Soc. **25**: 305. *pl. 39.* — Bois, Jour. de Bot. **17**: 16–22. *f.* 1–18.—Taubert; E. & P. Nat. Pfl. 3^3: 166.

slightly sagittate at the base and bifid at the apex, with the locules acuminate, longitudinally sulcate and dehiscing above by short slits not extending more than half the length of the locules; three upper stamens longitudinally connate, 1 or 2 lateral free, or all more or less firmly coherent at time of flowering, all strongly decurved over the ovary.

I have examined this form and find that dehiscence is as described. The anthers in my specimen were four, on very short, free filaments. In the dry condition they were hard, with the introrse terminal slit widely open but not extending more than a third the length of the conspicuous longitudinal furrow. When moist the walls were leathery in texture. In this condition they may easily be ruptured along the furrow, but the wall is firm enough here to indicate that in nature dehiscence is probably confined exclusively to the short terminal slits.

As will be seen from the literature some confusion has prevailed concerning the androecium of this species. Baillon considered that there are eight apiculate, laterally coherent unilocular anthers. Other writers have correctly regarded the androecium as composed of four or five laterally coherent bilocular anthers, with each locule produced into a terminal apiculum. This interpretation has been corroborated, with the addition of very interesting structural points, by the study of serial sections.

The members of the androecium are slightly coherent, but so far as could be determined there is no organic connection.

The structure of the anther is most intelligible when the sections are followed from the base towards the tip. As will be seen from figures representing the gross structure of the flower, the individual anthers are borne on short, flattened filaments extending as a ventral dark-brown connective towards the tip of the anther. The lowermost sections show only this connective (figure 2, a). A little above this plane the locules will be seen, the walls originating from the ventral surface of the connective (or filament) towards the median line (figure 2, b), the two margins of the connective extending as lateral wings. A little further above, the sections show a normal introrse anther with a prominent connective and two locules. The locellus-walls are broken down but evidently have been very short and the original division into four

locelli secured by the strong invagination of the lateral wall which is folded in almost to the connective. Here there is an indication of a beginning of the separation of the two locules (figure 2, c). The split soon extends across the connective, leaving the two halves of the anther free for the greater portion of their length. These conclusions are drawn from the examination of sections, and it is quite probable that the two halves become disconnected

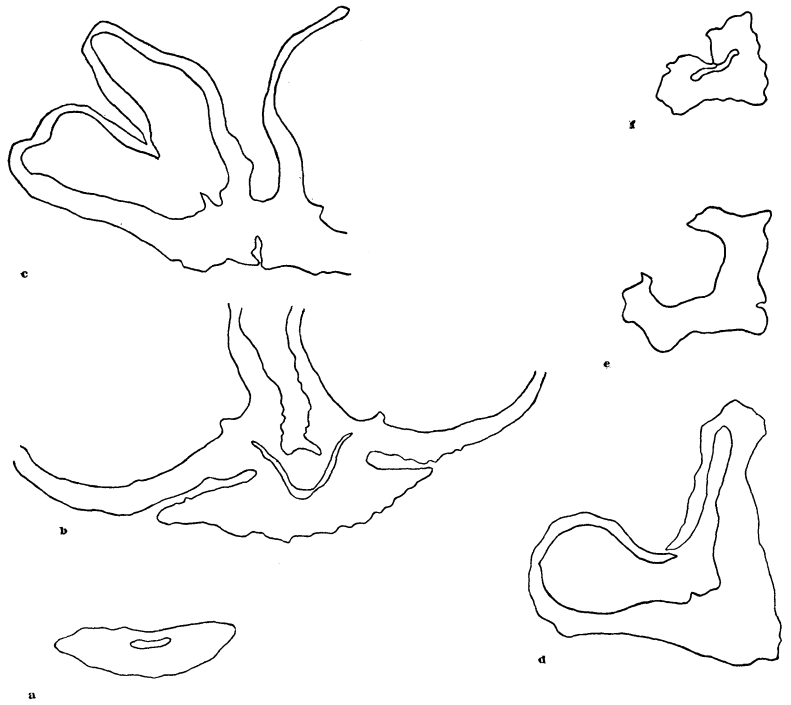

FIGURE 2. Anther-structure of *Duparquetia*.

lower in the anther in the process of sectioning than they would otherwise. At the same time the sharpness with which they are divided along the median line and the distance to which this separation of the locules extends from the tip indicate a natural longitudinal division.

As has been stated in the description of the gross structure of the flower, each locule opens by an introrse longitudinal split extending for some distance from the tip. The exact form of this

is made very clear by the sections. In the lower portion of each locule the wall is invaginated so as to be brought almost in contact with the connective, to which it has evidently been joined by a very short locellus-wall, the vestiges of which may still be seen extending from the connective and from the invaginated margin of the wall (figure 2, c). A little above this plane the furrow is not so deep and sharp but more rounded and the vestiges of the locellus-wall have almost completely disappeared. The wall then breaks along the line of invagination and throughout the remainder

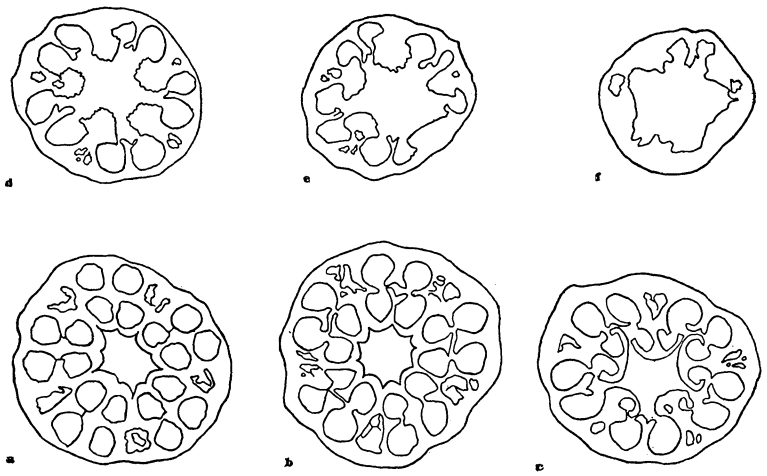

FIGURE 3. Anther-structure of *Strumpfia*.

of the length the margins gape more widely until the thickened, sterile tip is reached.

The third genus, a member of the *Rubiaceae*, is *Strumpfia* Jacq.* This genus is represented by a single species on the rocky coasts of the Antilles.

The androecium has been described as follows: "Anthers subsessile, wholly connate, nearly free from the corolla-base, forming an ovate-oblong column, membranaceous at the top, a little exceeded in length by the corolla segments" (Grisebach). DeCandolle says: "Antheris in tubum ovoideo-oblongum subpenta-

* Benth. & Hook. Gen. Pl. 2: 117. — DC. Prod. 4: 469. — Griseb. Fl. Brit. W. Ind. 335. — Jacq. Stirp. Am. 218. — Lam. Illustr. *pl.* 731. — Schnizlein, Iconog. *pl.* 127*b*. — Schumann; E. & P. Nat. Pfl. 4[4]: 104.

gonum concretis intus 5-locularibus, loculis nempe 3 externis, 2 internis regulariter dispositis!" but Grisebach writes: "The anomalous structure of the column, described by DeCandolle, must have been a monstrosity; for I find 10 anther-cells, regularly arranged in a single row." The figure given by Schnizlein represents a condition such as DeCandolle describes. Schumann says of the androecium: "Stb. unter sich der ganze Länge nach zu einer dem Grunde der Blkr. angehefteten Röhre verbunden; A. nur in der oberen Hälfte, wie mit Poren geöffnet."

Serial sections represented by figure 3 show the real condition of this synandrium. At the tips only the outer wall may be seen, smooth externally and rough internally. As the sections are followed down towards the base the cone is seen to be formed by the fusion of five 4-locellate anthers. Between these there are towards the outside four intercellular spaces which have been mistaken for locelli, and so lead to the statement that the synandrium has in the outer row fifteen and in the inner row ten locelli.

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